

Occupational Health Sciences

“Why does the Army have entomologists?” That’s a question frequently heard as members of the Entomological Sciences Program talk to visiting students or dignitaries. Well, there are a number of reasons why entomologists play an integral part of the Army Preventive Medicine Program.

Whenever troops are deployed throughout the world, one of the major concerns is the threat of vector-borne diseases. Throughout history, more casualties during war have resulted from non-battle injuries (NBI) than from combat. A significant portion of these NBIs have been due to vector-borne diseases. Even today, vector-borne diseases continue to be a major threat to indigenous populations as well as the relatively non-immune troops that may enter these areas during deployments. Diseases such as malaria, dengue fever, or yellow-fever, transmitted by mosquitoes; leishmaniasis, transmitted by sand flies; plague, transmitted by fleas; and tick-borne encephalitis, transmitted by ticks; continue to ravage the world’s human population. In 1994, after an absence of a number of years, malaria reappeared in U.S. troops stationed in South Korea. Even though for some of these diseases, vaccines or chemoprophylaxis are available, many disease organisms

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are becoming resistant to the drugs or are mutating such that vaccines or chemoprophylaxis are less effective.

In recent years, the U.S. has not been immune to vector-borne diseases. Lyme disease and Rocky Mountain spotted fever, two diseases transmitted by ticks, have



Investigation of Lyme disease health risk.

been significant health concerns. In addition, two new tick-borne diseases have been identified: human granulocytic ehrlichiosis (HGE) and human monocytic

ehrlichiosis (HME). We are still learning about the epidemiology of these two emerging tick-borne diseases. Occasional outbreaks of mosquito-borne diseases such as dengue fever and viral encephalitides may also occur. Dengue fever has been a serious problem in South and Central Americas and the Caribbean, and there is concern that the few cases that have occurred in the Southwest U.S. may significantly increase.

Another significant disease to recently occur in the U.S. is Sin Nombre virus, a form of hantavirus with pulmonary syndrome. Hantaviruses are ubiquitous and are found in varying forms throughout the world. In South Korea, for example, Korean hemorrhagic fever, a hemorrhagic fever with renal syndrome, remains a threat to U.S. forces located there. The vector/host for hantavirus is various species of rodents. Urine and feces from rodents infected with the hantavirus is how this disease is transmitted to humans. Program personnel conduct installation threat assessments for hantavirus and provide installation personnel with recommendations for personal protection against this disease. In addition, brochures, posters, fact sheets, and videos are also provided to assist in educating installation personnel about hantavirus.

For the professional staff working in the Entomological Sciences Program, these worldwide vector-borne diseases are a threat to the readiness of our forces, and we are actively developing and promoting personal protective measures for soldiers to use in order to remain healthy during training exercises in the Continental U.S. or when deployed overseas. Therefore, we have assisted in the development of a Technical Information Memorandum for the Armed Forces Pest Management Board entitled, Personal Protective Techniques Against Insects and Other Arthropods of Military Significance; and assisted the Deputy Chief of Staff for Operations in the preparation of wallet-size cards, pamphlets, and brochures designed to educate soldiers about disease threats and provide information on protective measures that should be initiated when deployed to areas of the world. We also conducted threat assessments for vector-borne diseases on DOD installations, and provided training to regular Army, Army Reserve, and National Guard units on subjects such as field sanitation, calibration and use of pesticide dispersal equipment, use of immunoassay kits for detecting pesticide residues, and proper application of clothing and skin repellents.

We have also developed the capability to identify arthropods (insects and ticks) and rodents and to test them for disease organisms. We use sophisticated techniques, such as indirect immuno-fluorescent antibody (IFA) to detect disease organisms.

Recently, we have begun using polymerase chain reaction (PCR) to detect the DNA and RNA of disease organisms, thereby significantly enhancing our capability to accurately detect these organisms. This method has tremendous potential to provide on-site determination of the presence of disease agents and efforts to miniaturize the PCR process in order to be field expedient have begun.

Pesticides have been one weapon in the arsenal available for controlling animal and plant pests. Unfortunately, the misuse of pesticides can cause adverse health and environmental effects. In addition, we have learned that pests, particularly insect pests, may become resistant to a particular pesticide. Consequently, it is imperative that we know that if pesticides must be used, it will in fact be efficacious against the pest species. Otherwise, we may be introducing a toxic chemical into the environment unnecessarily. Therefore, another Program activity is the conduct of resistance tests to determine pest resistance to pesticides. This service enables installations or field units to change the pesticide they are using to one that will be more effective against the particular pest species.

The DOD has mandated, as one of the Measures of Merit, that pesticide usage on military installations will be reduced 50 percent by the year 2000. To assist in meeting this goal, the Program conducts integrated pest

management (IPM) surveys in order to review current chemical and nonchemical pest management practices and to provide recommendations on the utilization of non-chemical control methods or less toxic pesticide chemicals. One particular area of emphasis has been the review of golf course operations, where it is known that a significant amount of pesticides (insecticides, herbicides, and fungicides) are applied. In addition to recommending IPM practices, guidance is also provided on the safe storage, mixing, and disposition of pesticides. Of equal concern is the health of the pesticide applicator and we provide guidance on the proper use of personal protective equipment and proper pesticide application techniques. Through agreements with the U.S. Army Environmental Center, Army Reserve Command, and the National Guard Bureau, Program personnel are preparing or reviewing installation pest management plans to ensure that proper IPM methods are being implemented and that pesticides utilized meet regulatory requirements. A project utilizing heat to control insect pests is currently being evaluated. This method, if deemed feasible, will reduce dependency on chemical pesticides and will assist in reducing the amount of pesticides applied on DOD property.



Another Program service designed to assist in disseminating pesticide and pest management information is the DOD Pesticide Hotline. This service, which began in 1976, provides the latest information on pesticides to military and other Federal activities. Items available from the Hotline include such things as pesticide product information, pesticide labels, Material Safety Data Sheets, pesticide fact sheets, technical guides, and Federal Register information. In addition, a quarterly Pest Management Bulletin is published, which provides the latest information on pesticide regulatory actions and IPM techniques.

The myriad of entomologically-related services are provided by

USACHPPM professional entomologists, biologists, and microbiologists located throughout the world. In Continental U.S., these services are provided by personnel located at USACHPPM Main at Aberdeen Proving Ground, MD and at three Direct Support Activities located at Fort George G. Meade, MD; Fort McPherson, GA; and US Army Garrison, Fitzsimons Army Medical Center, Aurora, CO. Overseas, the services originate from USACHPPM-Europe, located in Landstuhl, Germany, and USACHPPM-Pacific, located at Camp Zama, Japan.

So, why should the Army have military and civilian entomologists, biologists, and microbiologists working at

USACHPPM? We think, and hope that you would agree, that worldwide vector-borne diseases and the need to protect our soldiers from these diseases when deployed, and potential adverse health and environmental effects from the use of pesticides, warrant the inclusion of entomology in the Army Preventive Medicine Program.

If you would like additional information about the Entomological Sciences Program, contact the Program Manager, Dr. Edward S. Evans, Jr., at 410-436-3613; DSN 584-3613; 1-800-222-9698; FAX 410-436-2037; or visit our Web Page:

<http://chppm-www.apgea.army.mil/ento/>